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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,564	03/15/2004	Randall G. Kemink	POU920030216US1	9827
23413	7590	01/09/2006	EXAMINER	
CANTOR COLBURN, LLP			COMPTON, ERIC B	
55 GRIFFIN ROAD SOUTH			ART UNIT	
BLOOMFIELD, CT 06002			PAPER NUMBER	

3726

DATE MAILED: 01/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/800,564

Applicant(s)

KEMINK ET AL.

Examiner

Eric B. Compton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 8-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

1. Applicant's election with traverse of Group I, claims 1-7, in the reply filed on November 3, 2005, is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 8-13 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of JP 04-096355 to Aimoto.

AAPA, as found on pages 1-2 and Figures 1-2 of the Specification, discloses a prior art method of manufacturing a heat sink:

[0002] Figure 1 depicts a conventional heat sink 10 having a thermal face 12 that is concave. In the example shown in Figure 1, the distance *d* is about 25 μ m. Heat sink 10 includes a base 14 made from a metal (e.g., copper) having a plurality of metal (e.g., copper) fins 16 secured to the base 14. Fins 16 are

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positioned in grooves 18 and secured to base 14 by solder 20 which is a Pb-sn solder.

[0003] Figures 2a-2d illustrate the manufacturing process for heat sink 10 of Figure 1. The upper portion of base 14 including grooves 18, solder 20 and a portion of base 14 is represented as region 22 for convenience of illustration. Figure 2a depicts heat sink 10 heated above a melting temperature of Pb-Sn solder 20. Fins 16 are then placed in solder 20 in grooves 18. The heat sink 10 is then cooled to room temperature as shown in Figure 2b. Due to the differing coefficients of thermal expansion (CTE) between solder 20 and base 14, the solder 20 goes into tension and the base 14 goes into compression. The CTE of the solder 20 is about 25 ppm/c and the CTE of the copper base 14 and copper fins 16 is about 17 ppm/c.

[0004] The thermal face 12 is then machined to be planar as shown in Figure 2c. Over time, the tensile stresses in solder 20 relieve and solder 20 stretches. The compressive stresses in copper base 14 relieve over time and the copper base 14 shrinks. This results in thermal face 12 being concave as shown in Figure 2d. The concavity of thermal face 12 results in reduced contact between the heat sink 10 and the surface from which heat is to be transferred and poor heat transfer performance.

However, as recognized and discussed by Applicant, AAPA does not disclose the solder having a coefficient of thermal expansion lower than that of the metal base, wherein the stresses between the base and solder form a thermal face than is convex.

Aimoto discloses a method of manufacturing a heat sink. The JPO English

Abstract discloses:

PURPOSE: To offset warpage with cooling after soldering, and to lower thermal resistance by previously forming warpage so that the anti-adhesive area side of a heat sink is formed in a projecting shape.

CONSTITUTION: The projecting warpage of δ_1 is formed on the anti-ceramic substrate side of a heat sink 3 previously. Warpage is generated in the heat sink by the difference of the thermal expansion coefficients of both materials of the ceramic substrate 1 and the heat sink 3 when the ceramic substrate 1 and the heat sink 3 are soldered by using a heating system by forming such warpage. The warpage is changed into a recessed warpage, and δ_1 is reduced to δ_2 . Projecting warpage is absorbed on mounting to radiating fins, and the heat sink is brought to a flat state, and a contact area is increased. Accordingly, the thermal resistance of a semiconductor element after resin seal is reduced.

The Derwent English Abstract, title even refers to the thermal face as "convex."

Regarding claim 1, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the heat sink of AAPA by using a solder having a coefficient of thermal expansion lower than that of the metal base, such that the stresses between the base and solder form a thermal face than is convex, in light of the teachings of Aimoto, in order to increase the contact area between the heat sink and a semiconductor element. See JPO English Abstract; see *also* JP 2003-068949.

Regarding claims 2, and 5-6, AAPA discloses the coefficient of thermal expansion of the metal plate and fins is about 17 ppm/c. Thus, the coefficient of the solder must be less. It would have been obvious to use a solder having a coefficient of thermal expansion of 15 ppm/c, in order to provide optimal stresses in the thermal face of the heat sink. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, it would have been obvious to use 90IN-10Ag solder or Sn-Bi solder since these materials have the sought after coefficient of thermal expansion. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claims 3-4 and 7, AAPA discloses and/or suggests these features.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Compton whose telephone number is (571) 272-4527. The examiner can normally be reached on M-F 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc Jimenez can be reached on (571) 272-4530. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Eric B. Compton
Primary Examiner
Art Unit 3726

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